

THE PHYSICAL SIGNS OF IN-
CIPIENT PULMONARY
TUBERCULOSIS.

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THE PHYSICAL SIGNS OF INCIPIENT PULMONARY TUBERCULOSIS.

By ALBERT ABRAMS, A.M., M.D.,

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IN this communication, the writer intentionally ignores a review of the accepted signs peculiar to early phthisis with the object of giving prominence to a few original methods which he has successfully employed for many years in diagnosis. He can only refer succinctly to methods which he has already reported and is therefore constrained to direct the reader to the original communications bearing on the subjects cited. The successful treatment of pulmonary tuberculosis postulates an early diagnosis and justifies nearly always the aphorism: *Tuberculosis primis in stadiis semper curabilis*. One must not conclude the antithesis in later stages of the disease. Whereas one may diagnose early phthisis, one cannot always prognosticate, inasmuch as the character of the soil on which the seed has fallen is not always the object of correct interpretation, for considerable differences exist in the stock of vitality contributed to the body in different individuals. Thus, lung cavitation is, in my experience no index of an unfavorable prognosis, for such a condition is often an objective demonstration of tissue-resistance to germ invasion,

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very often a localized process and an available field for bronchial drainage. As a rule, the traditional aphorism, "*Qui bene diagnoscit, bene curat,*" applies most cogently to phthisis. Before one can properly appreciate the physical signs of early phthisis, one must possess a correct conception of the lung condition peculiar to this stage of the disease or antedating it.

The Lungs in Early Phthisis.—The essential morbid anatomy consists of a catarrhal process plus infiltration of the peribronchial and submucous tissues. The lungs predisposed to phthisis or already invaded show the presence of constant areas of diminished lung resonance varying from dullness to flatness as elicited by percussion. These areas or *atelectatic zones*,¹ as I have called them, may be dispelled by repeated forced inspirations or by vigorous cutaneous irritation so as to induce the *lung reflex*.² Not infrequently an entire apex may be collapsed or atelectatic and the condition may be interpreted erroneously either by percussion or radiodiagnosis³ as an infiltration. However, repeated forced inspirations plus the lung reflex will eliminate any error in this regard. In individuals predisposed to tuberculosis and in those who already have the disease, the lungs are practically in an emphysematous condition,⁴ viz., dilatation of the air vesicles with disappearance or loss of tone of the elastic fibers. The following conclusions have been formulated concerning this emphysematous lung condition or acute pulmonary dilatation:

In health, the percussion note of the lungs is resonant during inspiration, and dull or even flat during forced expiration.

2. In emphysema, the percussion note is unchanged during the two phases of respiration.

3. This unchanged percussion note, heretofore recognized in pulmonary vesicular emphysema is pathognomonic of lungs predisposed to tuberculosis, and of lungs already affected.

4. Associated with the unchanged percussion sound, there is an extension of the lung borders manifested by downward dislocation of the lung and diminution often to the extent of obliteration of the cardiac, hepatic and splenic areas of absolute dullness.

5. Unchanged percussion resonance, hyperresonance, and prolongation of the expiration are indicative of deficient expiratory force of the pulmonary substance, and constitute the earliest trustworthy signs of the so-called pretuberculous stage of tuberculosis. The restricted diaphragmatic movements peculiar to early phthisis owe their origin to the emphysematous lung condition.⁵ Rokitansky noted that too voluminous lungs coupled with a small heart characterized the phthisical habitus. This observation was soon relegated to oblivion, but it was revived by Brehmer and vigorously defended. The too voluminous lungs of Rokitansky and Brehmer are practically the lungs of emphysema (acute pulmonary dilatation).

I may be permitted to swerve from the continuity of my subject for the purpose of considering the relation that the lung condition in early phthisis bears to the treatment of the disease. It is not so much a question of how much air enters the lung as it is of how much air gets out. The stagnant pools of residual air promote a state of tissue asphyxiation, the patient practically rebreathing the air.

Some years ago⁶ I demonstrated clinically that the vagus nerve contained bronchoconstrictor and

bronchodilator fibers, and this observation was conclusively established later by the experimental investigations of Dixon and Brodie.⁷ The writer has availed himself of the latter fact, and by inducing the lung reflex of contraction⁸ in the treatment of phthisis, emphysema, and asthma, one may wield a puissant force in antagonizing pulmonary conditions associated with dilatation of the lungs.

Pulmonary Anemia.—Many years ago⁹ I directed attention to the occurrence of anemia of pulmonary origin associated with atelectatic zones **and dependent on insufficient lung development.** This form of anemia is characterized by loss in weight, whereas in the essential anemias, the well nourished condition of the patient is manifest.

There is another sign which distinguishes pulmonary from other forms of anemia, the one exception being, perhaps, progressive pernicious anemia, and that is the fact that, while the ferruginous preparations benefit pure anemics, in pulmonary anemia, they are practically valueless, at any rate the benefit accruing from their use is evanescent. The real pathognomonic sign of pulmonary anemia is the therapeutic test. Subject such an individual to a single pneumatic cabinet treatment, employing inhalations of compressed air, and one invariably finds after an examination of the blood an increase in the percentage of hemoglobin. A collective investigation demonstrated that the hemoglobin percentage could be increased, on an average, 15 per cent., after a single séance in the pneumatic cabinet. In the absence of a cabinet, a series of forced inspirations and expirations are less effective, although nevertheless efficient in establishing an augmentation in the percentage of hemoglobin. Pulmonary anemia is likewise one of the most im-

portant symptoms of early phthisis and may precede all other recognizable signs.

The reader is referred elsewhere¹⁰ for the explanation of the therapeutic test in pulmonary anemia. The writer is cognizant of the fact that the hematologist does not concede the existence of anemia in tuberculosis although practically every clinical symptom negatives the latter observation. The writer recognizes that the condition of the blood prevailing in polycythemia bears some relation to the condition which exists in tuberculosis. In polycythemia, dependent on chronic venous stasis, the capillary blood owing to its concentration contains more red corpuscles and hemoglobin than normal, and it is assumed that while this condition may exist in the peripheral circulation, it is not necessarily so with the blood in the rest of the body. This polycythemia is explained by supposing that owing to deficient oxidation, the result of the stasis, an augmentation of red corpuscles occurs as a compensatory process.

Vibrosuppression.—I have very recently described¹¹ an instrument called the vibrosuppressor for restricting vibrations of the sternum. In the absence of the latter simple apparatus, the lower end of the sternum may be forcibly compressed by the hand of the patient or an assistant while percussion is executed by the physician. If in association with compression of the sternum, percussion is executed during suspension of breathing after the patient has practised forcible expiration, the organs may be outlined with marvelous accuracy. This method, however, is especially available in the recognition of dullness peculiar to early phthisis. In the latter affection, resonance (owing to dilatation of the lungs) is the usual phenomenon elicited by

percussion, but if vibrosuppression is employed, dullness of one or both apices may be recognized. The writer has much reason to emphasize the importance of the latter sign.

Auscultatory Percussion.—If, during percussion, a stethoscope is allowed to hang from the ears of the physician (no part of the instrument being in contact with the chest of the patient), nuances in the percussion sound, unrecognizable by unassisted audition, are demonstrable. Here the stethoscope is employed as a microphone, and the writer has also found this simple expedient of value in topographic percussion. The writer's modified method of auscultatory percussion¹² is available in the elicitation of lung consolidation. It embodies the principle of transsonance. If it is desired to elicit the transsonance of the apices, the stethoscope is fixed first over one and then over the other apex, while immediate percussion with the finger is executed over a prominent vertebra. If the apices are to be auscultated posteriorly, the percussion blow is limited to the manubrium sterni. By this maneuver, one may easily recognize departures from normal transsonance provided the physician has familiarized himself with the latter, which is not difficult of attainment.

Auscultation.—Owing to the respiratory immobility of the lung apices, many auscultatory phenomena may escape recognition, and it is therefore often imperative to augment the respiratory activity of the apices. The latter object may be achieved by binding the lower chest prior to auscultation with a rubber bandage.

Tracheal Traction Test.—I have described this test¹³ as an aid in the diagnosis of idiopathic asthma. When the head of the patient is thrown forcibly

backward or turned to one side and so maintained during percussion, the normal resonance obtained by percussion over the manubrium sterni and lungs contiguous thereto becomes translated into a dull or flat sound during the time the cervical muscles are contracted. The latter evoke contraction of the bronchial muscles by stimulation of the pneumogastric nerves. The maneuver in question by contracting the bronchial tree will accentuate râles or other acoustic phenomena which may be present either over the apices or elsewhere over the lungs.

Stethophonometry.—If one is in the possession of a stethophonometer,¹⁴ one may estimate the comparative intensity of the sounds heard over both apices. Assuming that no stethophonometer is at our command, then the latter may be improvised by using the ordinary binaural stethoscope with soft rubber attachments. If, *e.g.* with one rubber tube compressed by the finger, the apical respiratory murmur is barely audible over one apex and very loud over the other apex, it is evident that the murmur is exaggerated in the latter situation.

Tuning Fork.—The writer regards the tuning fork of some value in testing the conductivity of the lung tissue and employs it after the following manner: A fork (with 120 vibrations) is attached to a cork and the latter is grasped by the teeth of the patient. Forks may be purchased with a hard rubber attachment, rendering the employment of the cork unnecessary. Without removing the tuning fork from the patient's mouth, the prongs are made to vibrate by compression by the fingers of the physician, during which time the apices or other portions of the lungs may be auscultated. The situation of the bronchi is revealed by the

exaggerated transmitted hum, and the hum is equally modified by the normal and consolidated lung.

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